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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/898,460	07/05/2001	Tokuya Kozaki	925-205	8134

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EXAMINER

NGUYEN, THINH T

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 09/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application

09/898,460

Applicant(s)

KOZAKI, TOKUYA

Examiner

Thinh T Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED OFFICE ACTION

### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed (see MPEP paragraph 606.01). A title such as -- Nitride semiconductor device with improved lifetime and high output power -- is suggested.

2. The specification is objected to for the following informality:

In the abstract the applicant said barrier layer 2c, which is an important part of the invention, is made of p-type impurity or grown without being doped. This layer is arranged close to the p-type layer side. However, on fig 4, fig 5, fig 6, and fig 7 it looks like this layer is arranged close to the layer 13 and layer 13 is n-type. These figures contradict the statement made by the applicant in the abstract.

Correction or clarification is required.

3. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant cooperation is requested in correcting any errors of which the applicant may become aware in the specification.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102(b/e) that form the basis for the rejections under this section made in this office action.

A person shall be entitled to a patent unless ---

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

5. Claim 1, 5,6,10 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Sasanuma et al. (US patent 6,252,894).

#### REGARDING CLAIM 1

Sasanuma et al. disclose (fig 1, fig 2) a nitride semiconductor device having a structure wherein an active layer of a quantum well structure (in the abstract), which has a well layer made of a nitride semiconductor that includes In and a barrier layer made of a nitride semiconductor, is sandwiched between a p-type nitride semiconductor layer and an n-type nitride semiconductor layer, wherein said active layer has, as said barrier layer, a first barrier layer (layer 119 fig 1, column 5 line 40) arranged in a position nearest to said p-type nitride semiconductor layer and a second barrier layer (layer 117 fig 1, column 5 line 39) that is different from the first barrier layer; and wherein said first barrier layer does not substantially include an n-type impurity while said second barrier layer includes an n-type impurity.

#### REGARDING CLAIM 5,6,10

Sasanuma et al. have the first barrier layer in the outermost position of the active layer with p-type impurity (fig 1 layer 119) and the second barrier layer (fig 1 layer 117) in the outermost position close to the n-type nitride semiconductor layer.

#### REGARDING CLAIM 16

Sasanuma et al. disclose a nitride semiconductor device (fig 1) wherein the device has the first p-type nitride semiconductor layer ( fig 1 layer 121) adjoining the active layer in said p-type nitride semiconductor layer, and said first p-type nitride semi-conductor layer is made of a nitride semiconductor that includes Al.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of U.S.C. 103(a) which form the basis for all obviousness rejections set forth in this office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2- 4,7-9,11-15,17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasanuma et al. (US patent 6,252,894) in view of further remark.

**REGARDING CLAIM 2, 7,11,19,22**

Sasanuma et al. disclose all the invention except for the detail of specifying the relative ratio of the thickness of the barrier layers or the impurity densities of the p-type barrier layer, or the ratio of al in the clad layer. However it has been held that discovering the optimum value of a result effective variable involves only routine skill in the art.

In Re Boesch 617 F2. 2d 272, 205 USPQ 215

REGARDING CLAIM 3, 4, 8,12,14, 18

The formation of a quantum well active layer that consist a plurality of n-type barrier layers, p-type barrier layers, undoped ( i-type) barrier layers, well layers that are layered in sequence has become old and well known in the art and is considered an obvious choice of design.

REGARDING CLAIM 9,20,23

Sasanuma et al. disclose all the invention except for the thickness of the well layer or the barrier layer, or the distance of the well layer from the first p nitride semiconductor layer; however a change in size is generally recognized as being within the level of ordinary skill in the art.

In Re Rose 105 USPQ 237 (CCPA 1955).

REGARDING CLAIM 13

The grow of the undoped barrier layer made of nitride semiconductor has become Known in the art and is considered an obvious choice of design

REGARDING CLAIM 15

Sasanuma et al. show the use of cladding layers (fig 1 layer 121 and 115) for quantum wells using nitride semiconductor that include aluminum

REGARDING TO CLAIM 17

Sasanuma et al. show the structure (fig 1) of a nitride semiconductor device wherein said first p-type nitride semiconductor layer is provided so as to contact a barrier layer nearest to said p-type nitride semiconductor layer, and the growing of a doped layer

with a p-type impurity of which concentration is higher than that of said barrier layer in the active layer is routine skill for a person with ordinary skill in the art.

#### REGARDING CLAIM 21

Sasanuma et al. show a nitride semiconductor device (fig 1) with the p-type nitride semiconductor layer has an upper clad layer made of a nitride semiconductor that includes Al and the n-type nitride semiconductor layer has a lower clad layer made of a nitride semiconductor; even though Sasanuma et al. do not specify the mixing ratio of aluminum, the mixing of the correct ratio for aluminum is considered routine skill for a person with ordinary skill in the art.

8. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and the page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

9. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to be abandoned (see M.P.E.P. 710.02(b)).

10. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d) which papers have been placed of record in the file.

#### CONCLUSION

11. The prior arts made of record and not relied upon are considered pertinent to applicant disclosure: Rennie et al. (US patent 5,786,603) disclose a multilayer semiconductor device; Nishio et al. (US patent 5,786,606) disclose a semiconductor light emitting device;

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Ueki (US patent 6,320,893) disclose a surface emitting semiconductor laser; Goetz et al. (US patent 6,441,393) disclose a semiconductor devices with selectively doped III-V nitride layers.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thinh T Nguyen whose phone number is (703) 305-0421. The Examiner can normally be reached on Monday to Friday from 8.30 A.M. to 5.00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's Supervisor, David C. Nelms can be reached on (703) 308-4910. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Thinh T. Nguyen

TTN

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HOAI HO  
PRIMARY EXAMINER